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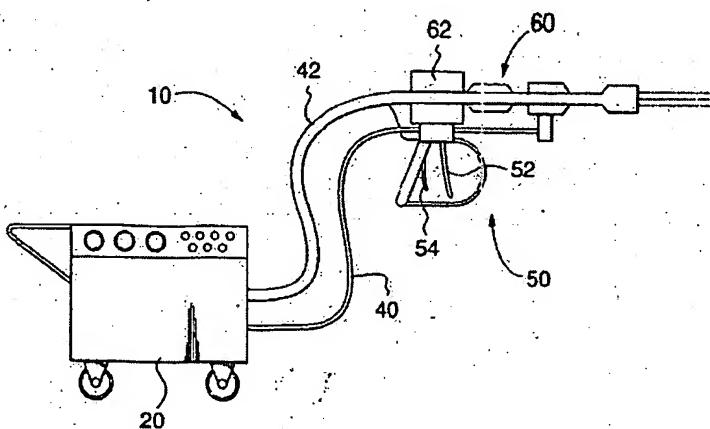
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(54) Title: ULTRASONIC WATERJET APPARATUS



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(57) Abstract: An ultrasonic waterjet apparatus (10) has a mobile generator module (20) and a high-pressure water hose (40) for delivering high-pressure water from the mobile generator module (20) to a hand-held gun (50) with a trigger and an ultrasonic nozzle (60). An ultrasonic generator in the mobile generator module (20) transmits high-frequency electrical pulses to a piezoelectric or magnetostrictive transducer (62) which vibrates to modulate a high-pressure waterjet flowing through the nozzle (60). The waterjet exiting the ultrasonic nozzle (60) is pulsed into mini slugs of water, each of which imparts a waterhammer pressure on a target surface. The ultrasonic waterjet apparatus (10) may be used to cut and de-burr materials, to clean and de-coat surfaces, and to break rocks. The ultrasonic waterjet apparatus (10) performs these tasks with much greater efficiency than conventional continuous-flow waterjet systems because of the repetitive waterhammer effect. A nozzle with multiple exit orifices or a rotating nozzle (76) may be provided in lieu of a nozzle with a single exit orifice to render cleaning and de-coating large surfaces more efficient. A water dump valve (27) and controlling solenoid are located in the mobile generator module (20) rather than the gun (50) to make the gun lighter.